Machine translation JP2000287212

(19)**Publication country**Japan Patent Office (JP)
(12)**Kind of official gazette**A publication of patent applications (A)
(11)**Publication No.**JP,2000-287212,A (P2000-287212A)
(43)**Date of Publication**Heisei 12(2000) October 13 (2000.10.13)
(54)**Title of the Invention**Image encoding apparatus
(51)**The 7th edition of International Patent Classification**

H04N 7/32

// H03M 7/36
FI

H04N 7/137 Z

H03M 7/36
Request for Examination Unrequested
The number of claims 2
Mode of ApplicationOL
Number of Pages5
(21)**Application number**Japanese Patent Application No. 11-91687
(22)**Filing date**Heisei 11(1999) March 31 (1999.3.31)
(71)**Applicant**
Identification Number000004329
NameVictor Company of Japan, Ltd.
Address3-12, Moriya-cho, Kanagawa-ku, Yokohama-shi, Kanagawa-ken
(72)**Inventor(s)**
NameNiihara Flood
Address3-12, Moriya-cho, Kanagawa-ku, Yokohama-shi, Kanagawa-ken Inside of Victor Company of Japan, Ltd.
Theme code (reference)

5C059

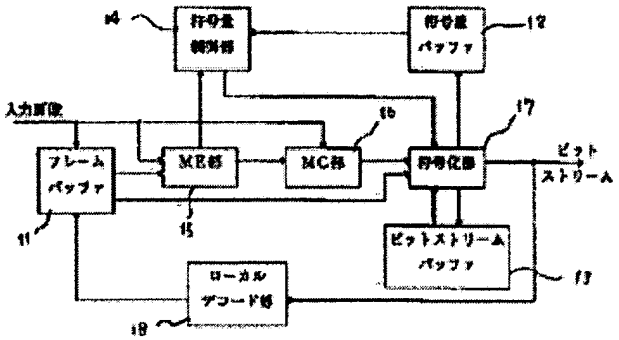
5J064
F-term (reference)

5C059 KK02 MA00 MA05 MA47 NN20 NN21 NN28 PP05 TA49 TA62 TB03 TB07 TC12 TC38 TD06 UA02

5J064 AA01 BA13 BB03 BC01 BC02 BD01

Abstract:
PROBLEM TO BE SOLVED: To eliminate changes in an image which is used to happen by a decode image difference of an I frame and to improve an image visual quality with respect to a still area part such as a background by reading a code of the I frame 1 GOP prior to a bit stream buffer in the case of a macroblock that is decided to be a still area and encoding the code as a code of the still area. SOLUTION: In a code amount control part 14, with respect to a macroblock which is decided to be a still area, a code amount of a corresponding macroblock in an I frame 1 GOP before is read from a code amount buffer 12 and integrated on the basis of a still/dynamic area decision result from an ME part 15. In an encoding part 17, encoding is performed on the basis of the still/dynamic area decision result and a target code amount supplied by the code amount control part 14 by macroblocks. In the

case of the still area, a code of the corresponding macroblock in the I frame 1 GOP before in a bit stream buffer 13 is read and this is outputted as a code of a present macroblock.



JPO Machine translation abstract:
(57) **Abstract**
SUBJECT The coding equipment of a picture using MPEG is provided.
Means for Solution The buffer 11 which accumulates the I frame (F) in front of 1GOP in an image encoding apparatus, The motion vector primary detecting element 15 which judges stillness and a motion area for every MB between IF in front of 1GOP, and the present IF when F which performs the present processing is IF, The code amount buffer 12 which accumulates a generated code amount for every MB of IF, and the bit stream buffer 13 which accumulates a bit stream generated for every MB of said IF per MB, From MB judged in said primary detecting element to be a static region, read a generated code amount of IF in front of 1GOP from said buffer 12, and it asks for total, The code quantity controller 14 which computes target code quantity of MB judged with the remaining code amounts in said primary detecting element to be a motion area, MB judged to be said motion area codes according to said target code quantity, In the case of the coding part 17 which numerals of IF in front of 1GOP are read from said buffer 13 in MB judged to be said static region, and codes as numerals of said static region, and PF and BF, it had the motion compensation section 16 which performs motion compensation prediction.

Claim(s)
Claim 1A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A bit stream buffer which accumulates a bit stream generated for every macro block of said I frame in a macro block unit, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity

controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from said code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A coding part which a macro block judged to be said motion area codes according to said target code quantity, and numerals of the I frame in front of 1GOP are read from said bit stream buffer in the case of a macro block judged to be said static region, and codes as numerals of said static region. An image encoding apparatus which comprising a motion compensation section which performs motion compensation prediction in the case of p frames or the B frame.
Claim 2A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a processing frame is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A quantized value buffer which accumulates a quantized value for every macro block of said I frame, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from a code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which codes by reading a quantized value of a macro block to which the I frame in front of 1GOP corresponds, and a macro block to which the I frame in front of 1GOP corresponds from said three frame buffers from said quantized value buffer in the case of a macro block judged to be said static region, An image encoding apparatus which comprising a motion compensation section which performs motion compensation prediction in the case of p frames or the B frame.

Detailed Description of the Invention
0001
Field of the Invention This invention relates to coding of the picture which used MPEG.
0002
Description of the Prior Art The sequence of the image coding using MPEG is shown in drawing 3. Here, the p frames which constitute the unit called GOP in a multiple frame, perform frame inner code-ization called the I frame in one of frames of this, and perform forward prediction for other frames, and B frame coding which performs both-directions prediction are performed. Each frame is divided into the unit called a macro block, and in the case of p frames and the B frame, a motion vector is detected for every macro block, it determines coding mode, determines a quantized value, and performs coding of a prediction error, a motion vector, and coding mode. In the case of the I frame, it codes by determining a quantized value for every macro block.
0003 To a stationary part, by p frames, it is choosing NoMCNotCoded which makes a motion vector zero and does not code a prediction error, and the picture of the same position of the previous I frame is copied and outputted by the decoded picture. The picture similarly decoded by making a motion vector into zero and not sending a prediction error in the B frame can reproduce the same picture as the previous I frame. Thus, it is possible to code all the frames in GOP about a stationary part, so that the same decoding picture as the I frame may be acquired.
0004 However, since coding is performed within a frame about the following I frame, coding is performed regardless of the I frame in front of 1GOP. For this reason, it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control about a stationary part, noises in a picture, etc. even if it was the same quantized value. In such a case, the stationary part became a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and degradation on vision was caused.
0005
Problem(s) to be Solved by the Invention About the following I frame, coding is performed regardless of the I frame in front of 1GOP, and it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control

about a stationary part for this reason, noises in a picture, etc. even if it was the same quantized value. In such a case, a stationary part serves as a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and there was a problem of causing degradation on vision.

0006

Means for Solving the Problem In order to solve this problem, an invention of Claim 1, A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A bit stream buffer which accumulates a bit stream generated for every macro block of said I frame in a macro block unit, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from said code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which numerals of the I frame in front of 1GOP are read from said bit stream buffer in the case of a macro block judged to be said static region, and codes as numerals of said static region, In the case of p frames or the B frame, comprise a motion compensation section which performs motion compensation prediction, and an invention of Claim 2, A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A quantized value buffer which accumulates a quantized value for every macro block of said I frame, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from a code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which codes by reading a quantized value of a macro block to which the I frame in front of 1GOP corresponds, and a macro block to which the I frame in front of 1GOP corresponds from said three frame buffers from said quantized value buffer in the case of a macro block judged to be said static region, In the case of p frames or the B frame, it comprised a motion compensation section which performs motion compensation prediction.

0007

Embodiment of the Invention One working example of the coding equipment by this invention is described below with drawing 1. The coding equipment which becomes this invention as shown in drawing 1 comprises the frame buffer 11, the code amount buffer 12, the bit stream buffer 13, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, and the local decoding part 18.

0008 As for p frames and the B frame, the following processings are performed as usual. An inputted image is supplied to the ME section 15 which detects a motion vector, and MC part 16 which performs motion compensation prediction.

0009 In the ME section 15, between the image comparison which local decoding is carried out by the local decoding part 18, and is accumulated in the three frame buffers 11, and an inputted image, block matching is carried out to a macro block unit, and the optimal motion vector is detected. The detected motion vector is supplied to MC part 16. In MC part 16, prediction mode is determined as a macro block unit from the motion vector supplied, an inputted image, and the image comparison in the three frame buffers 11, and prediction mode, a motion vector, and a prediction error are supplied to the coding part 17.

0010 In the coding part 17, based on the quantized value instructed to be the prediction mode and the motion vector which are supplied from MC part 16, and a prediction error from the code quantity controller 14, quantization of a prediction error and the coding which combined prediction mode and

a motion vector are performed, and a bit stream is generated and outputted.

0011 Before coding by supplying an inputted image to the three frame buffers 11 and the ME section 15 in the case of the I frame, an inputted image is accumulated in the three frame buffers 11. An inputted image and the I frame before accumulating in the three frame buffers 11 beforehand are supplied to the ME section 15, and a motion vector is detected to a macro block unit. When the detected motion vector is zero and there is nothing at a static region and zero, the information on stillness and a motion area decision result is supplied to the code quantity controller 14 as a motion area.

0012 In the code quantity controller 14, it integrates about the macro block judged to be a static region by reading the code amount of the corresponding macro block in the I frame in front of 1GOP from the code amount buffer 12 based on the stillness and the motion area decision result from the ME section 15. From the addition code amount about the macro blocks of all the I frames (Is), the value which subtracted the target code quantity (Ia) of the present I frame is considered as the addition (Im) of the target code quantity of the macro block judged to be a motion area, and code quantity control is performed to the coding part 17.

0013 In the coding part 17, it codes based on the stillness and the motion area decision result, and target code quantity which are supplied to a macro block unit from the code quantity controller 14. In the case of a static region, the numerals of the macro block to which the I frame in front of 1GOP in the bit stream buffer 13 corresponds are read, and it outputs this as numerals of the present macro block.

0014 In the case of a motion area, the macro block of I frame of the present GOP is read from the three frame buffers 11, and it codes so that it may become target code quantity. Numerals are outputted as a bit stream for every macro block generated, and it is accumulated in a macro block unit in the bit stream buffer 13.

0015A generated code amount is accumulated in a macro block unit at the code amount buffer 12. Since a virtual buffer causes underflow and an addition code amount (Is) cannot code to the target code quantity (Ia) of the present I frame when large, all the macro blocks are made into a motion area, and all the macro blocks are coded.

0016 Other working example of the image encoding apparatus of this invention is described below with drawing 2. The coding equipment which becomes this invention as shown in drawing 2 comprises the frame buffer 11, the code amount buffer 12, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, the local decoding part 18, and the quantized value buffer 19. Although the numerals for every macro block were accumulated in drawing 1, the quantized value for every macro block is accumulated in drawing 2.

0017 Since a quantized value can be expressed by 5 bits of the value to 0-31, thereby, it can reduce memory quantity. In this case, about a static region, it codes by the coding part 17 reading a quantized value from a macro block and the quantized value buffer 19 corresponding from the I frame in front of 1GOP in the three frame buffers 11. A quantized value is accumulated in the quantized value buffer 19 for every macro block about all the macro blocks.

0018

Effect of the Invention By this invention, change of the picture which had occurred according to the decoding picture difference of the I frame is lost about static region portions, such as a background, and vision top image quality improves.

Field of the Invention This invention relates to coding of the picture which used MPEG.

Description of the Prior Art The sequence of the image coding using MPEG is shown in drawing 3. Here, the p frames which constitute the unit called GOP in a multiple frame, perform frame inner code-ization called the I frame in one of frames of this, and perform forward prediction for other frames, and B frame coding which performs both-directions prediction are performed. Each frame is divided into the unit called a macro block, and in the case of p frames and the B frame, a motion vector is detected for every macro block, it determines coding mode, determines a quantized value, and performs coding of a prediction error, a motion vector, and coding mode. In the case of the I

frame, it codes by determining a quantized value for every macro block.
0003 To a stationary part, by p frames, it is choosing NoMCNotCoded which makes a motion vector zero and does not code a prediction error, and the picture of the same position of the previous I frame is copied and outputted by the decoded picture. The picture similarly decoded by making a motion vector into zero and not sending a prediction error in the B frame can reproduce the same picture as the previous I frame. Thus, it is possible to code all the frames in GOP about a stationary part, so that the same decoding picture as the I frame may be acquired.
0004 However, since coding is performed within a frame about the following I frame, coding is performed regardless of the I frame in front of 1GOP. For this reason, it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control about a stationary part, noises in a picture, etc. even if it was the same quantized value. In such a case, the stationary part became a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and degradation on vision was caused.

Effect of the Invention By this invention, change of the picture which had occurred according to the decoding picture difference of the I frame is lost about static region portions, such as a background, and vision top image quality improves.

Problem(s) to be Solved by the Invention About the following I frame, coding is performed regardless of the I frame in front of 1GOP, and it may become the decoding picture which changed with the case where a quantized value turns into a value which changed with code quantity control about a stationary part for this reason, noises in a picture, etc. even if it was the same quantized value. In such a case, a stationary part serves as a different picture for every GOP, therefore the change will be noticeable on vision in the unit of GOP, and there was a problem of causing degradation on vision.

Means for Solving the Problem In order to solve this problem, an invention of Claim 1, A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A bit stream buffer which accumulates a bit stream generated for every macro block of said I frame in a macro block unit, As opposed to a macro block judged by said motion vector primary detecting element to be a static region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from said code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which numerals of the I frame in front of 1GOP are read from said bit stream buffer in the case of a macro block judged to be said static region, and codes as numerals of said static region, In the case of p frames or the B frame, comprise a motion compensation section which performs motion compensation prediction, and an invention of Claim 2, A frame buffer which accumulates the I frame in front of 1GOP, the I frame of the present GOP, and a decoded reference frame in an image encoding apparatus which codes an inputted image, A motion vector primary detecting element which judges stillness and a motion area for every macro block by the I frame in front of 1GOP, and the present I inter-frame when a frame which performs the present processing is the I frame, A code amount buffer which accumulates a generated code amount for every macro block of the I frame, A quantized value buffer which accumulates a quantized value for every macro block of said I frame, As opposed to a macro block judged by said motion vector primary detecting element to be a static

region, A code quantity controller which computes target code quantity of a macro block which read a generated code amount of the I frame in front of 1GOP from a code amount buffer, asked for the total, and was judged by said motion vector primary detecting element with the remaining code amounts to be a motion area, A macro block judged to be said motion area codes according to said target code quantity, A coding part which codes by reading a quantized value of a macro block to which the I frame in front of 1GOP corresponds, and a macro block to which the I frame in front of 1GOP corresponds from said three frame buffers from said quantized value buffer in the case of a macro block judged to be said static region, In the case of p frames or the B frame, it comprised a motion compensation section which performs motion compensation prediction.

0007

Embodiment of the Invention One working example of the coding equipment by this invention is described below with drawing 1. The coding equipment which becomes this invention as shown in drawing 1 comprises the frame buffer 11, the code amount buffer 12, the bit stream buffer 13, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, and the local decoding part 18.

0008 As for p frames and the B frame, the following processings are performed as usual. An inputted image is supplied to the ME section 15 which detects a motion vector, and MC part 16 which performs motion compensation prediction.

0009 In the ME section 15, between the image comparison which local decoding is carried out by the local decoding part 18, and is accumulated in the three frame buffers 11, and an inputted image, block matching is carried out to a macro block unit, and the optimal motion vector is detected. The detected motion vector is supplied to MC part 16. In MC part 16, prediction mode is determined as a macro block unit from the motion vector supplied, an inputted image, and the image comparison in the three frame buffers 11, and prediction mode, a motion vector, and a prediction error are supplied to the coding part 17.

0010 In the coding part 17, based on the quantized value instructed to be the prediction mode and the motion vector which are supplied from MC part 16, and a prediction error from the code quantity controller 14, quantization of a prediction error and the coding which combined prediction mode and a motion vector are performed, and a bit stream is generated and outputted.

0011 Before coding by supplying an inputted image to the three frame buffers 11 and the ME section 15 in the case of the I frame, an inputted image is accumulated in the three frame buffers 11. An inputted image and the I frame before accumulating in the three frame buffers 11 beforehand are supplied to the ME section 15, and a motion vector is detected to a macro block unit. When the detected motion vector is zero and there is nothing at a static region and zero, the information on stillness and a motion area decision result is supplied to the code quantity controller 14 as a motion area.

0012 In the code quantity controller 14, it integrates about the macro block judged to be a static region by reading the code amount of the corresponding macro block in the I frame in front of 1GOP from the code amount buffer 12 based on the stillness and the motion area decision result from the ME section 15. From the addition code amount about the macro blocks of all the I frames (Is), the value which subtracted the target code quantity (Ia) of the present I frame is considered as the addition (Im) of the target code quantity of the macro block judged to be a motion area, and code quantity control is performed to the coding part 17.

0013 In the coding part 17, it codes based on the stillness and the motion area decision result, and target code quantity which are supplied to a macro block unit from the code quantity controller 14. In the case of a static region, the numerals of the macro block to which the I frame in front of 1GOP in the bit stream buffer 13 corresponds are read, and it outputs this as numerals of the present macro block.

0014 In the case of a motion area, the macro block of I frame of the present GOP is read from the three frame buffers 11, and it codes so that it may become target code quantity. Numerals are outputted as a bit stream for every macro block generated, and it is accumulated in a macro block unit in the bit stream buffer 13.

0015A generated code amount is accumulated in a macro block unit at the code amount buffer 12. Since a virtual buffer causes underflow and an addition code amount (Is) cannot code to the target code quantity (Ia) of the present I frame when large, all the macro blocks are made into a motion area, and all the macro blocks are coded.

0016 Other working example of the image encoding apparatus of this invention is described below

with drawing 2. The coding equipment which becomes this invention as shown in drawing 2 comprises the frame buffer 11, the code amount buffer 12, the code quantity controller 14, the ME section 15, MC part 16, the coding part 17, the local decoding part 18, and the quantized value buffer 19. Although the numerals for every macro block were accumulated in drawing 1, the quantized value for every macro block is accumulated in drawing 2.

0017 Since a quantized value can be expressed by 5 bits of the value to 0-31, thereby, it can reduce memory quantity. In this case, about a static region, it codes by the coding part 17 reading a quantized value from a macro block and the quantized value buffer 19 corresponding from the I frame in front of 1GOP in the three frame buffers 11. A quantized value is accumulated in the quantized value buffer 19 for every macro block about all the macro blocks.

Brief Description of the Drawings

Drawing 1 It is a lineblock diagram showing one working example of the coding equipment of this invention.

Drawing 2 It is a lineblock diagram showing other working example of the coding equipment of this invention.

Drawing 3 It is a figure showing the sequence of the image coding using MPEG.

Description of Notations

11 Frame buffer
12 Code amount buffer
13 Bit stream buffer
14 Code quantity controller
15 ME section
16 MC part
17 Coding part
18 Local decoding part
19 Quantized value buffer

Drawing 1

For drawings please refer to the original document.

Drawing 2

For drawings please refer to the original document.

Drawing 3

For drawings please refer to the original document.

For drawings please refer to the original document.

---

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開2000－287212
（P2000－287212A）
(43)公開日　平成12年10月13日(2000.10.13)

(51)Int.Cl.⁷	識別記号	ＦＩ		テーマコード(参考)
Ｈ０４Ｎ　7/32		Ｈ０４Ｎ　7/137	Ｚ	５Ｃ０５９
// Ｈ０３Ｍ　7/36		Ｈ０３Ｍ　7/36		５Ｊ０６４

審査請求　未請求　請求項の数２　ＯＬ　（全 5 頁）

(21)出願番号　特願平11－91687

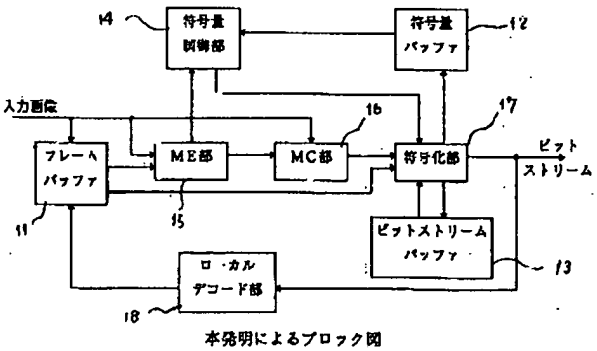
(22)出願日　平成11年３月31日(1999.3.31)

(71)出願人　000004329
日本ビクター株式会社
神奈川県横浜市神奈川区守屋町３丁目12番地
(72)発明者　新原　高水
神奈川県横浜市神奈川区守屋町３丁目12番地　日本ビクター株式会社内

Ｆターム(参考)　5C059 KK02 MA00 MA05 MA47 NN20 NN21 NN28 PP05 TA49 TA62 TB03 TB07 TC12 TC38 TD06 UA02
5J064 AA01 BA13 BB03 BC01 BC02 BD01

(54)【発明の名称】　画像符号化装置

(57)【要約】
【課題】　MPEGを用いた画像の符号化装置を提供する。
【解決手段】画像符号化装置において、１ＧＯＰ前のＩフレーム（Ｆ）を蓄積するバッファ11と、現在処理を行うＦがＩＦの場合、１ＧＯＰ前のＩＦと現在のＩＦ間で静止・動領域の判定をＭＢ毎に行う動きベクトル検出部15と、ＩＦのＭＢ毎の発生符号量を蓄積する符号量バッファ12と、前記ＩＦのＭＢ毎に生成されるビットストリームをＭＢ単位に蓄積するビットストリームバッファ13と、前記検出部で静止領域と判定されたＭＢに対して、１ＧＯＰ前のＩＦの発生符号量を前記バッファ12から読み出し総和を求め、残りの符号量にて、前記検出部で動領域と判定されたＭＢの目標符号量を算出する符号量制御部14と、前記動領域と判定されたＭＢは前記目標符号量に応じて符号化を行い、前記静止領域と判定されたＭＢの場合は前記バッファ13から１ＧＯＰ前のＩＦの符号を読み出し前記静止領域の符号として符号化を行う符号化部17と、ＰＦやＢＦの場合は動き補償予測を行う動き補償部16とを備えた。



本発明によるブロック図

【特許請求の範囲】
【請求項１】入力画像を符号化する画像符号化装置において、
１ＧＯＰ前のＩフレーム、現在のＧＯＰのＩフレーム、及び復号した参照フレームを蓄積するフレームバッファと、
現在処理を行なうフレームがＩフレームの場合、１ＧＯＰ前のＩフレームと現在のＩフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、
Ｉフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、
前記Ｉフレームのマクロブロック毎に生成されるビットストリームをマクロブロック単位に蓄積するビットストリームバッファと、
前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、１ＧＯＰ前のＩフレームの発生符号量を前記符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、
前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記ビットストリームバッファから１ＧＯＰ前のＩフレームの符号を読み出し前記静止領域の符号として符号化を行なう符号化部と、
ＰフレームやＢフレームの場合は動き補償予測を行なう動き補償部とから構成されることを特徴とする画像符号化装置。
【請求項２】入力画像を符号化する画像符号化装置において、
１ＧＯＰ前のＩフレーム、現在のＧＯＰのＩフレーム、及び復号した参照フレームを蓄積するフレームバッファと、
処理フレームがＩフレームの場合、１ＧＯＰ前のＩフレームと現在のＩフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、
Ｉフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、
前記Ｉフレームのマクロブロック毎の量子化値を蓄積する量子化値バッファと、
前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、１ＧＯＰ前のＩフレームの発生符号量を符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、
前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記量子化値バッファから１ＧＯＰ前のＩフレームの対応するマクロブロックの量子化値と前記３フレームバッファから１ＧＯＰ前のＩフレームの対応するマクロブロックとを読み出し符号化を行なう符号化部と、
ＰフレームやＢフレームの場合は動き補償予測を行なう動き補償部とから構成されることを特徴とする画像符号化装置。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、MPEGを用いた画像の符号化に関する。
【０００２】
【従来の技術】MPEGを用いた画像符号化のシーケンスを図３に示す。ここでは、複数フレームをGOPと呼ばれる単位を構成し、このうちの１フレームをＩフレームと呼ばれるフレーム内符号化を行ない、その他のフレームを前方向予測を行なうＰフレーム、及び、両方向予測を行なうＢフレーム符号化を行なう。各フレームは、マクロブロックと呼ばれる単位に分割され、Ｐフレーム、Ｂフレームの場合は、各マクロブロック毎に動きベクトルの検出を行ない、符号化モードの決定をし、量子化値の決定を行ない、予測誤差と動きベクトルと符号化モードの符号化を行なう。Ｉフレームの場合は、各マクロブロック毎に量子化値の決定を行ない、符号化をする。
【０００３】静止部分に対しては、Ｐフレームでは、動きベクトルをゼロとし予測誤差を符号化しないNoMCNotCodedを選択することで、デコードされた画像では、先のＩフレームの同一位置の画像がコピーされて出力される。また、Ｂフレームでは、動きベクトルをゼロとし、予測誤差を送らないことで、同様にデコードされた画像は、先のＩフレームと同一の画像を再生することが可能である。この様に、静止部分に関しては、GOP内の全フレームを、Ｉフレームと同一のデコード画像を得るように符号化を行なうことが可能である。
【０００４】しかし、次のＩフレームに関してはフレーム内で符号化が行なわれる為、１GOP前のＩフレームとは無関係に符号化が行なわれる。このため、静止部分に関して、量子化値が符号量制御により異なった値になる場合や、また、画像中のノイズ等により同一の量子化値であっても、異なったデコード画像となることがある。この様な場合、静止部分が、GOP毎に異なる画像となり、従ってGOPの単位でその変化が視覚上目立つこととなり、視覚上の劣化を引き起こしていた。
【０００５】
【発明が解決しようとする課題】次のＩフレームに関しては、１GOP前のＩフレームとは無関係に符号化が行なわれ、このため、静止部分に関して、量子化値が符号量制御により異なった値になる場合や、また、画像中のノイズ等により同一の量子化値であっても、異なったデコード画像となることがある。この様な場合、静止部分

が、GOP毎に異なる画像となり、従ってGOPの単位でその変化が視覚上目立つこととなり、視覚上の劣化を引き起こすという問題点があった。

【0006】

【課題を解決するための手段】この問題を解決するために、請求項1の発明は、入力画像を符号化する画像符号化装置において、1GOP前のIフレーム、現在のGOPのIフレーム、及び復号した参照フレームを蓄積するフレームバッファと、現在処理を行なうフレームがIフレームの場合、1GOP前のIフレームと現在のIフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、Iフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、前記Iフレームのマクロブロック毎に生成されるビットストリームをマクロブロック単位に蓄積するビットストリームバッファと、前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、1GOP前のIフレームの発生符号量を前記符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記ビットストリームバッファから1GOP前のIフレームの符号を読み出し前記静止領域の符号として符号化を行なう符号化部と、PフレームやBフレームの場合は動き補償予測を行なう動き補償部とから構成され、請求項2の発明は、入力画像を符号化する画像符号化装置において、1GOP前のIフレーム、現在のGOPのIフレーム、及び復号した参照フレームを蓄積するフレームバッファと、現在処理を行なうフレームがIフレームの場合、1GOP前のIフレームと現在のIフレーム間で静止・動領域の判定をマクロブロック毎に行なう動きベクトル検出部と、Iフレームのマクロブロック毎の発生符号量を蓄積する符号量バッファと、前記Iフレームのマクロブロック毎の量子化値を蓄積する量子化値バッファと、前記動きベクトル検出部により静止領域と判定されたマクロブロックに対して、1GOP前のIフレームの発生符号量を符号量バッファから読み出しその総和を求め、残りの符号量にて、前記動きベクトル検出部により動領域と判定されたマクロブロックの目標符号量を算出する符号量制御部と、前記動領域と判定されたマクロブロックは前記目標符号量に応じて符号化を行ない、前記静止領域と判定されたマクロブロックの場合は前記量子化値バッファから1GOP前のIフレームの対応するマクロブロックの量子化値と前記3フレームバッファから1GOP前のIフレームの対応するマクロブロックとを読み出し符号化を行なう符号化部と、PフレームやBフレームの場合は動き補償予測を行なう動き補償部とから構成されるようにした。

【0007】

【発明の実施の形態】本発明による符号化装置の一実施例を図1と共に以下に説明する。図1に示すように本発明になる符号化装置は、フレームバッファ11、符号量バッファ12、ビットストリームバッファ13、符号量制御部14、ME部15、MC部16、符号化部17及びローカルデコード部18より構成される。

【0008】Pフレーム及びBフレームは、従来と同様に以下の処理が行なわれる。入力画像は、動きベクトルの検出を行なうME部15、及び、動き補償予測を行なうMC部16に供給される。

【0009】ME部15では、ローカルデコード部18でローカルデコードされ3フレームバッファ11に蓄積されている参照画像と、入力画像間で、マクロブロック単位にブロックマッチングを行ない最適な動きベクトルの検出を行なう。検出された動きベクトルは、MC部16に供給される。MC部16では、供給される動きベクトルと入力画像及び3フレームバッファ11中の参照画像から予測モードの決定をマクロブロック単位に行ない、予測モード、動きベクトルと予測誤差を符号化部17に供給する。

【0010】符号化部17では、MC部16から供給される予測モード、動きベクトルと予測誤差と、符号量制御部14から指示される量子化値に基づき予測誤差の量子化と、予測モード、動きベクトルを併せた符号化を行ない、ビットストリームを生成し出力する。

【0011】Iフレームの場合は、入力画像は、3フレームバッファ11とME部15に供給され、符号化を行なう前に、入力画像は、3フレームバッファ11に蓄積される。ME部15には、入力画像と、3フレームバッファ11に予め蓄積されている以前のIフレームとが供給されて、動きベクトルの検出をマクロブロック単位に行なう。検出された動きベクトルがゼロの場合は静止領域、ゼロで無い場合は動領域として、符号量制御部14に静止・動領域判定結果の情報を供給する。

【0012】符号量制御部14では、ME部15からの静止・動領域判定結果を基に、静止領域と判定されたマクロブロックに関して、1GOP前のIフレームでの対応するマクロブロックの符号量を符号量バッファ12から読み出し、積算を行なう。Iフレーム全てのマクロブロックに関しての積算符号量(Is)から、現在のIフレームの目標符号量(Ia)を引いた値を、動領域と判定されたマクロブロックの目標符号量の積算(Im)とし、符号化部17に対して符号量制御を行なう。

【0013】符号化部17では、マクロブロック単位に符号量制御部14から供給される、静止・動領域判定結果と目標符号量をもとに符号化を行なう。静止領域の場合は、ビットストリームバッファ13中の1GOP前のIフレームの対応するマクロブロックの符号を読み出し、これを現在のマクロブロックの符号として出力する。

【００１４】動領域の場合は、現在のGOPのＩフレームのマクロブロックを３フレームバッファ１１より読み出し、目標符号量になるように符号化を行なう。生成されるマクロブロック毎に符号は、ビットストリームとして出力されると共に、マクロブロック単位に、ビットストリームバッファ１３に蓄積される。

【００１５】また、発生符号量をマクロブロック単位に符号量バッファ１２に蓄積する。また、現在のＩフレームの目標符号量(Ia)に対して、積算符号量(Is)が、大きい場合は、仮想バッファがアンダーフローを起こすので符号化が行なえないため、全てのマクロブロックを動領域とし、全てのマクロブロックの符号化を行なう。

【００１６】また、本発明の画像符号化装置の他の実施例について図２と共に以下に説明する。図２に示すように本発明になる符号化装置は、フレームバッファ１１、符号量バッファ１２、符号量制御部１４、ＭＥ部１５、ＭＣ部１６、符号化部１７、ローカルデコード部１８及び量子化値バッファ１９より構成される。図１では、マクロブロック毎の符号を蓄積していたが、図２では、マクロブロック毎の量子化値を蓄積する。

【００１７】量子化値は０～３１までの値の５ビットで表現することが出来るため、これによりメモリ量の削減が行なえる。この場合、静止領域に関しては、３フレームバッファ１１中の１GOP前のＩフレームから対応するマクロブロックと量子化値バッファ１９より量子化値とを符号化部１７が読み出し、符号化を行なう。全てのマクロブロックに関して、量子化値を量子化値バッファ１９にマクロブロック毎に蓄積する。

【００１８】

【発明の効果】本発明により、背景等の静止領域部分に関して、Ｉフレームのデコード画像差により起きていた画像の変化が無くなり、視覚上画質が向上する。

【図面の簡単な説明】

【図１】本発明の符号化装置の一実施例を示す構成図である。

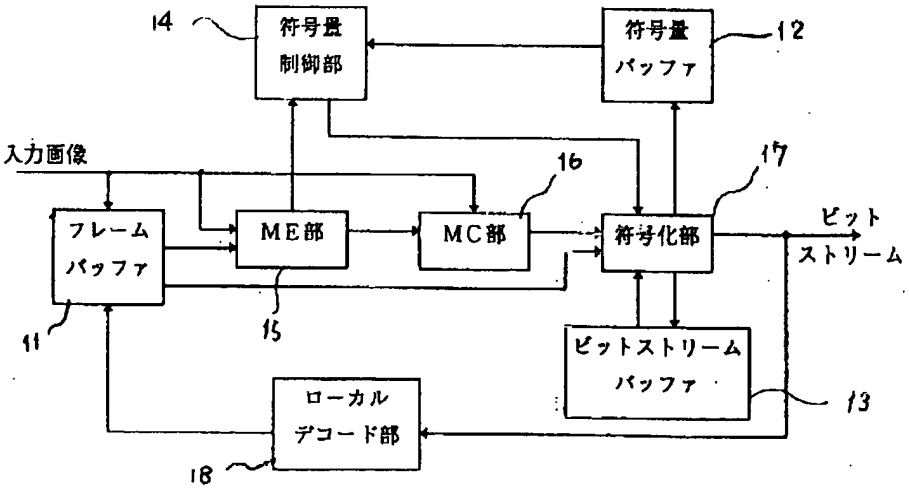
【図２】本発明の符号化装置の他の実施例を示す構成図である。

【図３】MPEGを用いた画像符号化のシーケンスを示した図である。

【符号の説明】

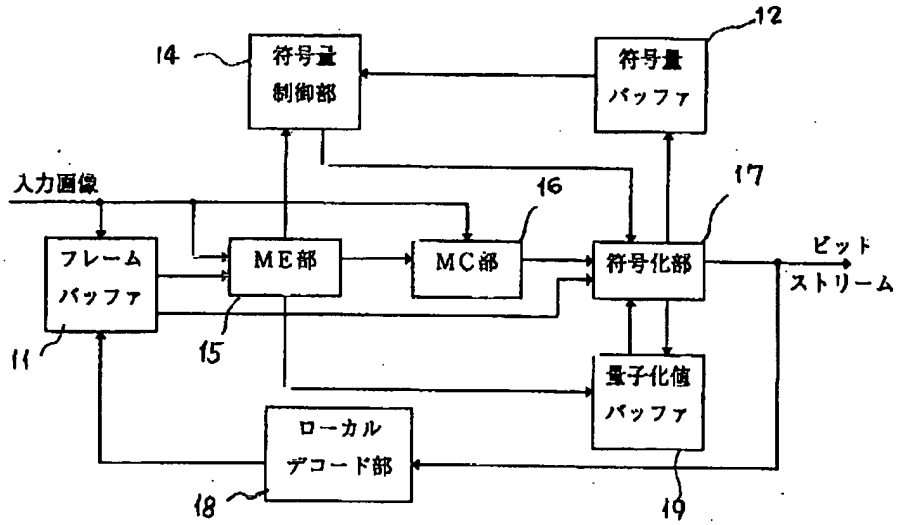
１１　フレームバッファ
１２　符号量バッファ
１３　ビットストリームバッファ
１４　符号量制御部
１５　ＭＥ部
１６　ＭＣ部
１７　符号化部
１８　ローカルデコード部
１９　量子化値バッファ

【図１】



本発明によるブロック図

【図2】



本発明による別のブロック図

【図3】